

## Insight

In 2023, the intersection of Artificial Intelligence (AI) and Quantum Computing (QC) has profoundly impacted the banking and financial industry. These technologies have revolutionised the way financial institutions operate, significantly impacting payments, risk management, and cybersecurity.

This article discusses the impact of open-source AI models, QC in transactional security, and regulations and governance on banking and finance.

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## The Importance of AI and Quantum Computing in the Banking Industry

The banking industry is undergoing a profound transformation, driven by the convergence of Artificial Intelligence (AI) and Quantum Computing (QC). These revolutionary technologies are reshaping the financial services sector, introducing unprecedented levels of efficiency, cost savings, and enhanced customer experiences.

## AI Software Market's Surging Revenue A Visualization of Growth

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The AI software market is experiencing a remarkable growth trajectory, with annual revenue projected to reach a staggering \$126 billion by 2025.

This visualisation showcases the market's impressive growth from 2018 to 2025, highlighting the increasing demand for AI-powered solutions across various industries.

## The Power of AI in Banking

AI algorithms have demonstrated remarkable capabilities in analysing vast amounts of data, identifying patterns, and making informed decisions. This ability is proving invaluable to banks across various aspects of their operations.

**Risk Assessment** AI-powered risk management systems can analyse complex financial data to assess creditworthiness, identify potential fraud, and mitigate financial risks. This enables banks to make more informed lending decisions and protect their capital.

**Loan Approval Processes** AI can streamline loan approval processes, reducing turnaround times and improving customer satisfaction. By automating tasks and leveraging predictive analytics, banks can process applications more efficiently and expeditiously.

**Investment Portfolio Optimisation** AI can analyse market trends, risk factors, and individual investment goals to optimise investment portfolios. This can help clients achieve their financial objectives while managing their risk appetite effectively.

**Fraud Detection** AI algorithms can detect patterns in transaction data that may indicate fraudulent activity. This enables banks to flag suspicious transactions and take appropriate action to prevent financial losses.

**Customer Service** AI can augment human customer service interactions by providing proactive support, resolving queries promptly, and recommending personalised products and services. This can enhance customer satisfaction and loyalty.

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**Quantum Computing** Unlocking Unparalleled Data Analysis

HSBC has been at the forefront of integrating quantum computing into the financial sector. The Bank has collaborated with technology providers and research laboratories to explore the application of quantum technologies to real-world problems.

HSBC was the first bank to protect AI-powered foreign exchange trading with quant

um in 2023 . In a world-first trial, HSBC used Quantum Key Distribution to safeguard a €30 million trading scenario from Euros to US dollars. This trial showed that quantum technology will protect trades of any value when it becomes commercially accessible and scalable.

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## The Rise of Open-Source AI A Paradigm Shift in Artificial Intelligence

The year 2023 has witnessed a remarkable surge in the adoption of open-source AI technology, particularly in the realm of Large Language Models (LLMs). Open-source AI refers to AI software and tools whose source code is available to developers, researchers, and other stakeholders.

This democratisation of AI technology has fostered significant advancements, fuelled the proliferation of open-source models, and solidified LLMs as a frontrunner in AI innovation. These models have played a pivotal role in driving innovation, enhancing decision-making, and improving risk management across various industries.

## Open-Source LLMs Revolutionising the AI Landscape

Open-source LLMs, such as WizardLM and LLaMA 2 , have emerged as formidable competitors to closed-source models. For instance, Vicuna , an economical LLM, achieved 90% of ChatGPT's capabilities despite the entire training process costing a mere \$300. LLaMA 2 has set the gold standard for ethical AI by achieving the lowest violation scores to date. Open-source LLMs are more transparent and customizable than "black box" closed-source LLMs, which lack interpretability.

## Explosive Growth of Open-Source AI Models in 2023

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This bar chart vividly illustrates the remarkable rise of open-source AI models

in 2023, with a staggering surge in both the number of projects and the number of contributions. This trend highlights the growing significance of open-source AI in driving innovation and fostering collaboration within the AI community.

Several open-source LLMs have garnered significant attention for their groundbreaking capabilities:

**Mixtral 8x7B** Developed by Mistral AI, this powerful AI language model stands out for its open weights, allowing for local operation with less restrictions than competitors' models. It processes up to 32K token context windows and supports multiple languages including French, German, Spanish, Italian, and English. Mixtral 8x7B is designed for compositional work, data analysis, software troubleshooting, and programming. It claims to match or exceed OpenAI's GPT-3.5 and outperform Meta's LLaMA 2-70B model in certain benchmarks.

**GPT-NeoX-20B** With a staggering 20 billion parameters, GPT-NeoX-20B stands as a leading open-source LLM. GPT-NeoX-20B is based on GPT-3 but introduces synchronous data parallelism and gradient checkpointing to improve performance and efficiency. The model has demonstrated exceptional performance across various tasks, including question-answering, summarization, and translation.

**GPT-J** With 6 billion parameters, GPT-J offers greater accessibility compared to larger models. GPT-J is trained on the Pile dataset and shares its roots with the GPT-2 architecture. It understands conversational nuances, provides insights from diverse sources, adapts its tone and style, and prioritises ethical and responsible content generation.

**OPT-175B** Boasting an unprecedented size of 175 billion parameters, the OPT-175B stands as a behemoth of efficiency and scale. Trained on unlabelled text data predominantly containing English sentences, OPT-175B employs the Transformer a

rchitecture to hierarchically process input text. The model has demonstrated impressive performance across various tasks, including question-answering, summarisation, and translation.

LLMa 2 With 1.6 billion parameters, LLMa 2 showcases versatility, catering to a wide range of tasks, including question-answering, summarisation, and translation. Trained on the Pile dataset and using the Transformer architecture, LLMa 2 proves its adaptability across various applications.

Google Gemini LLM Unveiled in 2023, Google Gemini LLM represents a significant step forward in the realm of large language models. Touted as a successor to PaLM 2, Gemini LLM is designed to excel in various domains, including natural language understanding, generating different creative text formats, and applying knowledge to solve problems. With its ability to process multimodal data, Google Gemini LLM holds great potential for applications in areas like computer vision, scientific research, and healthcare. The model is currently available in three sizes: Ultra, Pro, and Nano, catering to different computational requirements.

### The Open-Source AI Revolution Shaping the Future of AI

The open-source AI revolution is fundamentally transforming the landscape of AI development, deployment, and utilisation. By making AI more accessible, affordable, and versatile, open-source technology is democratising AI's capabilities and paving the way for groundbreaking innovations and applications. As the open-source movement gains momentum, we can confidently anticipate even more transformative advancements that will shape the future of AI and its profound impact on our world.

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### The challenges of regulating AI

Another challenge is making sure that AI systems are fair and unbiased. AI systems can perpetuate existing biases in the data they are trained on. It is therefore important to develop AI systems that are transparent and accountable, and that can be audited to identify and address potential biases.

Finally, it is important to establish ethical guidelines for the development and deployment of AI. AI systems should be designed and used in a way that is responsible and respectful of human rights. For example, AI systems should not be used to harm or exploit individuals, and they should not be used to invade individuals' privacy.

Addressing these challenges will require a multi-stakeholder approach that involves governments, businesses, researchers, and civil society. It is important to start the conversation now about how to regulate AI in a way that balances the need for privacy and security with the need for innovation.

## The State of AI Governance of AI Governance

In 2023, significant global initiatives and developments have shaped the landscape of AI governance and regulation. These activities reflect the growing recognition of the need for robust frameworks to oversee the development and deployment of AI technologies.

In the United States, President Joe Biden issued an executive order to manage the risks associated with AI and support international efforts to govern AI. The White House Office of Science and Technology Policy (OSTP) has been engaged in extensive discussions with researchers, companies, and civil society to inform AI governance. The U.S. is working with its allies and partners on AI governance, including participation in the G7 Hiroshima AI Process and the United Kingdom's AI

Safety Summit .

The UK hosted the inaugural AI Safety Summit , bringing global government leaders together to discuss the risks of AI and internationally coordinated action .

The Bletchley Declaration saw 28 countries plus the EU pledge to work together to address the risks posed by AI during the first AI Safety Summit in the UK.

MIT leaders and scholars released a set of policy briefs on AI governance to help policymakers create better oversight. A Framework for U.S. AI Governance Creating a Safe and Thriving AI Sector proposes that existing government entities regulate AI tools.

More than 60 countries in the Americas, Africa, Asia, and Europe have published national AI strategies, reflecting the global momentum towards AI governance. China has been active in launching principles and regulations, including the Global AI Governance Initiative and the Interim Administrative Measures for the Management of Generative AI Services .

These initiatives and developments show the growing need for coordinated national and international efforts to provide responsible AI development and deployment . While progress has been made, AI's complex and rapidly evolving nature presents ongoing challenges that require continued attention.

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Conclusion

The year 2023 has seen significant advancements in the fields of AI and QC, particularly in the banking industry. HSBC's pioneering use of quantum protection for AI-powered trading represents a significant milestone in the application of these technologies in the banking sector. Open-source models have accelerated AI maturity, while MIT's white papers on AI governance provide a roadmap for regulat

ion. These developments will shape the future of AI and QC, with profound implications for banking and finance.

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Want to learn more about the impact of AI and Quantum Computing on the banking industry?

In closing, I hope this article has sparked your interest in the transformative power of AI and Quantum Computing in the banking industry.

If you're eager to learn more about the intersection of AI and Quantum Computing in the banking industry, don't hesitate to reach out to me on [LinkedIn](#) or via the [Contact](#) page .

You can also join me on my new YouTube channel, [Banking on Quantum](#) , where I'll explore the latest developments in these transformative technologies and their implications for the future of finance.

Subscribe to [Banking on Quantum](#) today and stay ahead of the curve in this rapidly evolving field!

Thank you again for your time and I look forward to hearing from you!

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